CLAIMS

1. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation ring electrode in contact with or near a tissue surface; and

an ablation ring electrode disposed on the shaft; wherein

a distance from the shaft near the ablation ring electrode to the tissue surface is adjustable.

2. The catheter according to claim 1, wherein the ablation ring electrode is rotatably disposed on the shaft and constructed and arranged to change the distance between the shaft near the ablation ring electrode and the tissue surface when rotated around a shaft longitudinal axis.

3. The catheter according to claim 1, wherein the ablation ring electrode is eccentrically shaped.

4. A method of adjusting a distance between a shaft and a tissue surface, comprising:

positioning a catheter shaft at a first distance from a tissue surface, the catheter shaft surface being near an ablation ring electrode that is mounted on the shaft; and

moving the shaft to a second, different distance from the tissue surface.

5. The method according to claim 4, comprising rotating the ablation ring electrode relative to the catheter shaft.

6. The method according to claim 5, wherein the ablation ring electrode is mounted eccentrically.

7. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation electrode in contact with a tissue surface, the shaft having a longitudinal axis; and

an ablation electrode rotatably disposed on the shaft and constructed and arranged to change a distance between the shaft and the tissue surface when rotated around the shaft longitudinal axis.

8. The catheter according to claim 7, wherein the ablation electrode has one continuous outer surface.

9. The catheter according to claim 7, wherein the ablation electrode is stiff.

10. The catheter according to claim 7, wherein the ablation electrode has an outer surface constructed of a single piece of material.

11. The catheter according to claim 7, wherein the ablation electrode has an outer surface that is oval in a radial cross-section.

12. The catheter according to claim 7, wherein the ablation electrode has an outer surface that is eccentric in a radial cross-section.

13. The catheter according to claim 7, wherein the ablation electrode has an outer surface that is asymmetric in a radial cross-section.

14. The catheter according to claim 7, wherein the ablation electrode has an outer surface that is non-circular in a radial cross-section.

15. The catheter according to claim 7, wherein the ablation electrode has a center longitudinal axis and the shaft longitudinal axis is a center longitudinal axis; and

the ablation electrode is disposed on the shaft such that the ablation electrode center longitudinal axis and the shaft center longitudinal axis are eccentric.

16. The catheter according to claim 7, wherein the ablation electrode is rotatable relative to the shaft.

17. The catheter according to claim 7, wherein the ablation electrode and the shaft are rotatable together.

18. The catheter according to claim 7, wherein the shaft is oval in a radial cross-section.

19. The catheter according to claim 7, wherein the shaft is asymmetric in a radial cross-section.

20. The catheter according to claim 7, wherein the shaft is eccentric in a radial cross-section.

21. The catheter according to claim 7, wherein the shaft is non-circular in a radial cross-section.

22. The catheter according to claim 21, wherein the ablation electrode is circular in radial cross-section.

23. The catheter according to claim 21, wherein a width of the ablation electrode is larger than a width of the shaft.

24. The catheter according to claim 13, wherein the shaft is circular in radial cross-section.

25. The catheter according to claim 13, wherein a width of the ablation electrode is larger than a width of the shaft.

26. The catheter according to claim 7, wherein the ablation electrode is a ring electrode.

27. The catheter according to claim 7, in combination with an ablation energy supply, the energy ablation supply being electrically connected to the ablation electrode.

28. A catheter for ablating tissue, comprising:

a shaft having a longitudinal axis;

an ablation electrode disposed on the shaft and having a continuous outer surface, wherein the electrode outer surface circumscribes the shaft along a length of the shaft and is eccentric in a radial cross-section.

29. The catheter according to claim 28, wherein the shaft longitudinal axis is a center longitudinal axis and the ablation electrode outer surface has a center longitudinal axis; and

the center longitudinal axis of the ablation electrode outer surface and the shaft center longitudinal axis are eccentric.

30. The catheter according to claim 29, wherein the ablation electrode outer surface has bipolar symmetry about only one axis in a radial cross-section.

31. The catheter according to claim 28, wherein the outer surface of the ablation electrode is stiff.

32. The catheter according to claim 28, wherein the ablation electrode has an outer surface constructed of a single piece of material.

33. The catheter according to claim 28, wherein the ablation electrode is rotatable around the shaft longitudinal axis.

34. The catheter according to claim 33, wherein the ablation electrode is rotatable relative to the shaft.

35. The catheter according to claim 33, wherein the ablation electrode is rotatable together with the shaft.

36. The catheter according to claim 33, wherein the ablation electrode is constructed and arranged to change a distance between an outer surface of the shaft and a tissue surface when rotated around the shaft longitudinal axis.

37. The catheter according to claim 28, wherein the electrode outer surface is oval in a radial cross-section.

38. The catheter according to claim 28, wherein the electrode outer surface has a flat surface.

39. The catheter according to claim 28, in combination with an ablation energy supply, the energy ablation supply being electrically connected to the ablation electrode.

40. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation electrode in contact with a tissue surface, the shaft having an outer surface that is eccentric in a cross-section;

an ablation electrode disposed on the shaft;

wherein, in a first shaft orientation, the shaft outer surface is positioned a first distance from the tissue surface in the vicinity of the ablation electrode, and in a second, rotated shaft orientation, the shaft outer surface is positioned a second

distance from the tissue surface in the vicinity of the ablation electrode, the second distance being different than the first distance.

41. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation electrode at a distance from a tissue surface;

an ablation electrode disposed on the shaft and having an outer surface;

wherein the ablation electrode is moveable along the shaft in a longitudinal direction and the shaft is configured such that movement of the ablation electrode along the shaft in the longitudinal direction changes the distance between the electrode outer surface and the tissue surface.

42. The catheter according to claim 41, wherein the ablation electrode is a ring electrode.

43. The catheter according to claim 41, wherein the electrode outer surface is eccentric in a cross-section.

44. The catheter according to claim 41, wherein a longitudinal portion of the shaft is constructed and arranged to be spaced from the tissue surface.

45. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation electrode in contact with a tissue surface;

an ablation electrode disposed on the shaft and having an outer surface;

wherein the ablation electrode is moveable along the shaft in a longitudinal direction and the shaft is configured such that movement of the ablation electrode along the shaft in the longitudinal direction positions the electrode surface at a distance from the tissue surface.

46. A catheter for ablating tissue, comprising:

a shaft for positioning an ablation electrode at a distance from a tissue surface; and

an ablation electrode rotatably disposed on the shaft and constructed and arranged to change a distance between an outer surface of the ablation electrode and the tissue surface when rotated relative to a longitudinal axis of the shaft.

47. The catheter according to claim 46, wherein the outer surface of the ablation electrode is eccentric in a cross-section.

48. The catheter according to claim 46, wherein the ablation electrode outer surface has a center axis that is eccentric with a center axis of the portion of the shaft on which the ablation electrode is disposed.

49. A method of changing a distance from an outer surface of a catheter shaft to a tissue surface, comprising:

(a) placing an ablation electrode into contact with a tissue surface using a catheter shaft such that an outer surface of the catheter shaft is disposed a distance from the tissue surface in the vicinity of the ablation electrode; and

(b) rotating the ablation electrode to change the distance from the outer surface of the catheter shaft to the tissue surface.

50. The method according to claim 49, wherein the ablation electrode is eccentrically mounted on the catheter shaft.

51. The method according to claim 49, wherein the ablation electrode has an outer surface that is eccentric in a cross-section.

52. The method according to claim 49, wherein the ablation electrode has a continuous outer surface.

53. The method according to claim 49, wherein the outer surface of the ablation electrode is stiff.

54. The method according to claim 49, wherein an outer surface the ablation electrode is constructed of a single piece of material.

55. The method according to claim 49, wherein the ablation electrode is a ring electrode.

56. The method according to claim 49, wherein (b) comprises rotating the catheter shaft.

57. The method according to claim 49, wherein (b) comprises rotating the ablation electrode relative to the catheter shaft.

58. The method according to claim 49, wherein (b) comprises moving the ablation electrode along the shaft to rotate the ablation electrode relative to the catheter shaft.

59. The method according to claim 49, wherein the electrode is a ring electrode.

60. A method of changing a distance from an ablation electrode to a tissue surface, comprising:

(a) disposing an ablation electrode at a first distance from a tissue surface using a catheter shaft having a longitudinal direction; and

(b) disposing the ablation electrode at a second distance, different than the first distance, from the tissue surface by moving the ablation electrode along the catheter shaft in the longitudinal direction.

61. The method according to claim 60, further comprising:

(c) rotating the ablation electrode to change the distance from the catheter shaft to the tissue surface.

62. The method according to claim 60, wherein the ablation electrode is a ring electrode.